

## REMARKS

This is responsive to the Office Action of March 10, 2006. Claims 26-44 and 46-56 are pending in the application, and claims 1-25, 45, and 57-96 are cancelled without prejudice with Applicants reserving the right to pursue such claims in a divisional application.

In this Office Action, claims 26-44 and 46-56 stand rejected under 35 U.S.C. §103(a) as being obvious over both WO 00/63462 (“the ‘462 application”) and U.S. Patent No. 6,416,869 (“the ‘869 patent”) in view of U.S. Patent No. 6,475,300 (“the ‘300 patent”); and claims 26-42 stand rejected under 35 U.S.C. §103(a) as being obvious over WO 00/63303 (“the ‘303 application”) in view of the ‘300 patent.

Applicants’ methods have been more clearly defined by incorporating the subject matter of cancelled dependent claims 44 and 56, respectively, into independent claims 26 and 46. Accordingly, “polymeric material” has been replaced with “rubber” in claims 26 and 46. Therefore, claim 26 now recites a method of bonding rubber to a metal substrate, including, in part, applying an uncured rubber onto a surface of a metal substrate having a coating thereon and curing the rubber to bond the rubber to the coated metal substrate, while claim 46 similarly recites a method of bonding rubber to a metal substrate, including, in part, applying an uncured rubber onto a surface of a metal substrate having a solution applied thereon and curing the rubber with heat and pressure to bond the rubber to the metal substrate. Also, dependent claim 43 has been amended so as to properly depend from amended claim 26.

Finally, new dependent claims 97-100 have been added to further define the rubber. More specifically, new dependent claims 97 and 99, which depend, respectively, from

claims 26 and 46, recite that the rubber is a natural rubber, synthetic rubber, or combinations thereof. And, new dependent claims 98 and 100, which also depend, respectively, from claims 26 and 46, recite that the rubber is a sulfur-cured rubber, peroxide-cured rubber, or combinations thereof. Support for these new claims can be found throughout the specification and, more specifically, at least at Paragraph 0050 and original claim 59.

In view of the foregoing amendments, as well as the following remarks, Applicants respectfully submit that this application is in complete condition for allowance and requests reconsideration of the application in this regard.

### **35 U.S.C. §103 -- Rejections of Claims 26-44 and 46-56**

Examiner has rejected claims 26-44 and 46-56 as being obvious over both the '462 application and the '869 patent in view of the '300 patent.

In rejecting the claims, Examiner indicates that the '462 application and the '869 patent disclose all of Applicants' claimed limitations but fail to explicitly disclose a coating thickness in the range from about 0.1  $\mu\text{m}$  to about 1  $\mu\text{m}$  (or from about 0.2  $\mu\text{m}$  to about 0.6  $\mu\text{m}$ ). See Pages 4 and 13 of the Office Action. In an effort to fill this teaching void, Examiner cites the '300 patent for allegedly demonstrating that the coating thickness of a silane-based primer layer is a result effective variable, i.e. a variable which achieves a recognized result, insofar as this reference discloses that the primer coating thickness ensures sufficient corrosion resistance and adhesion properties. In view of the alleged teachings of the '300 patent, Examiner asserts that it would have been obvious to one of ordinary skill in the art to provide an optimized coating

thickness in the process of the '462 application and the '869 patent to arrive at Applicants' invention. *See* Pages 4 and 13-14. Applicants respectfully disagree.

Applicants' invention provides improved methods for bonding rubber to metal substrates while using less silane materials, thinner silane coatings, and providing strong rubber-to-metal bonds. The silane compositions used for coating the metal substrates include at least one substantially hydrolyzed amino-silane and at least one substantially hydrolyzed sulfur-containing silane. Such silanes reduce the hydrophobicity of the coating, previously believed necessary for strong bonds, without a reduction in bond strength. The rubber can include, for example, natural rubber, synthetic rubber, sulfur-cured rubber, peroxide-cured rubber, and combinations thereof. It is believed that the metal-silane complex bonds to rubber through nucleophilic Michael additions by the sulfur atoms in the sulfur-containing silane, respectively, to reactive double bonds (Michael acceptors) in the rubber, particularly sulfur cured rubber. A benefit of the present invention is that the film or coating thickness may be less than about 1  $\mu\text{m}$  and still provide a strong bond between rubber and metals. *See*, e.g., Specification, Paragraphs 0003, 0009, 0024, 0026, 0047, 0050, and 0053.

Concerning the '300 patent, this reference is directed towards a non-chromate metallic surface-treating agent, or primer, which includes, among other things, a silane coupling agent, e.g. vinyl and amino silane coupling agents. The coating amount of the treating agent can be applied to a substrate metallic surface preferably equivalent to a dry thickness of 1 to 20  $\mu\text{m}$ . If the dry thickness is less than 1  $\mu\text{m}$ , corrosion resistance will be insufficient. Any conventional top coating, e.g. a polyester topcoat, may be further applied to the treating agent. Since the

metallic surface-treating agent of the present invention comprises a silane coupling agent, the reactive moiety of the silane coupling agent is believed to be firmly bound to the substrate metal surface through metasiloxane bonding, and the organic moiety of the hydrophobic group is firmly bound to the organic film thereon to improve adhesion and thereby contribute to increased corrosion resistance. *See*, e.g., abstract; col. 2, lines 46-67; col. 5, lines 51-58; col. 6, lines 5-14 and 39-46, and the Examples.

In stark contrast to Applicants' claimed methods of bonding rubber to a metal substrate, the '300 patent simply fails to teach, suggest, or imply a silane solution that includes a sulfur-containing silane and is also completely devoid of any discussion of methods of use thereof for bonding rubber to metal. Notably, as discussed above, the '300 patent concerns itself with (non-sulfur based) non-chromate silanes for use in a primer coating for coating metallic substrates, such as is commonly performed as an initial step in painting. In addition, an optional top coating, e.g. a polyester top coating, NOT rubber, may be further applied to the primer of the '300 patent. Again, as indicated above, Applicants' sulfur-containing silane aids in providing effective adhesion of the rubber to the metal substrate. Accordingly, the silane solutions, as well as the methods of use thereof, in the '300 patent are quite different, i.e. non-analogous, to Applicants' silane solutions and methods of bonding rubber to metal substrates. And, while the '300 patent appears to disclose applying a 1 to 20  $\mu\text{m}$  dry coating thickness of a silane-based primer layer, this disclosure, particularly in view of the stark differences between Applicants' invention, simply fails to motivate one of ordinary skill in the art to optimize a coating thickness in the process of the '462 application and the '869 patent to arrive at Applicants' invention as

recited in claims 26 and 46.

In view of the above, Applicants' claimed methods are patentable over the combination of the '462 application and the '869 patent in view of the '300 patent.

Furthermore, even assuming *arguendo* that one skilled in the art would have been motivated to optimize the silane coating thickness in the process of the '462 application or the '869 patent due to the alleged teachings of the '300 patent, the combination clearly fails to teach or suggest Applicants' method of bonding rubber to metal wherein the coating formed has a thickness in the range from about 0.2  $\mu\text{m}$  to about 0.6  $\mu\text{m}$  as required by dependent claims 42 and 55. To establish *prima facie* obviousness of a claimed invention, it is certainly well established that all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In addition, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

As discussed above and asserted by Examiner, the '462 application and the '869 patent fail to disclose Applicants' claimed silane coating thickness. In addition, Applicants submit that the '300 patent similarly fails to teach or suggest a silane coating thickness of about 0.2  $\mu\text{m}$  to about 0.6  $\mu\text{m}$ . In fact, the '300 patent clearly teaches away from a coating that is less than 1  $\mu\text{m}$ . More specifically, the '300 patent states that if the dry thickness of the silane-based primer layer is less than 1  $\mu\text{m}$ , corrosion resistance will be insufficient. *See* col. 6, lines 5-9. Accordingly, Applicants submit that the rejection of claims 26 and 46 over the combination of

the '462 application and the '869 patent in view of the '300 patent is in error.

For all of the above reasons, the combination of both the '462 application and the '869 patent in view of the '300 patent does not render obvious Applicants' independent claims 26 and 46, or any of their dependent claims.

**35 U.S.C. §103 -- Rejection of Claims 26-42**

Claims 26-42 are rejected under § 103(a) as being unpatentable over the '303 application in view of the '300 patent. Applicants' distinguishing comments set out above with respect to the '300 patent apply equally to this rejection.

In rejecting the claims, Examiner states that the '303 application discloses all of Applicants' claimed limitations but fails to explicitly disclose a coating thickness in the range from about 0.1  $\mu\text{m}$  to about 1  $\mu\text{m}$  (or from about 0.2  $\mu\text{m}$  to about 0.6  $\mu\text{m}$ ). *See* Page 8 of the Office Action. In an effort to fill this teaching void, Examiner again cites the '300 patent for allegedly demonstrating that the coating thickness of a silane-based primer layer is a result effective variable, i.e. a variable which achieves a recognized result, insofar as it discloses that the primer coating thickness ensures sufficient corrosion resistance and adhesion properties.

For all of the reasons as previously set forth above, the combination of the '303 application in view of the '300 patent similarly fails to render obvious Applicants' independent claim 26, or any of its dependent claims.

### Conclusion

As a result of the remarks given herein, Applicants submit that the rejections of the pending claims have been overcome. Therefore, Applicants respectfully submit that this case is in condition for allowance and request allowance of the pending claims.

If Examiner believes any detailed language of the claims requires further discussion, Examiner is respectfully asked to telephone the undersigned attorney so that the matter may be promptly resolved. Should any fees or surcharges be deemed necessary, Examiner has authorization to charge fees or credit any overpayment to Deposit Account No. 23-3000.

Respectfully submitted,  
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